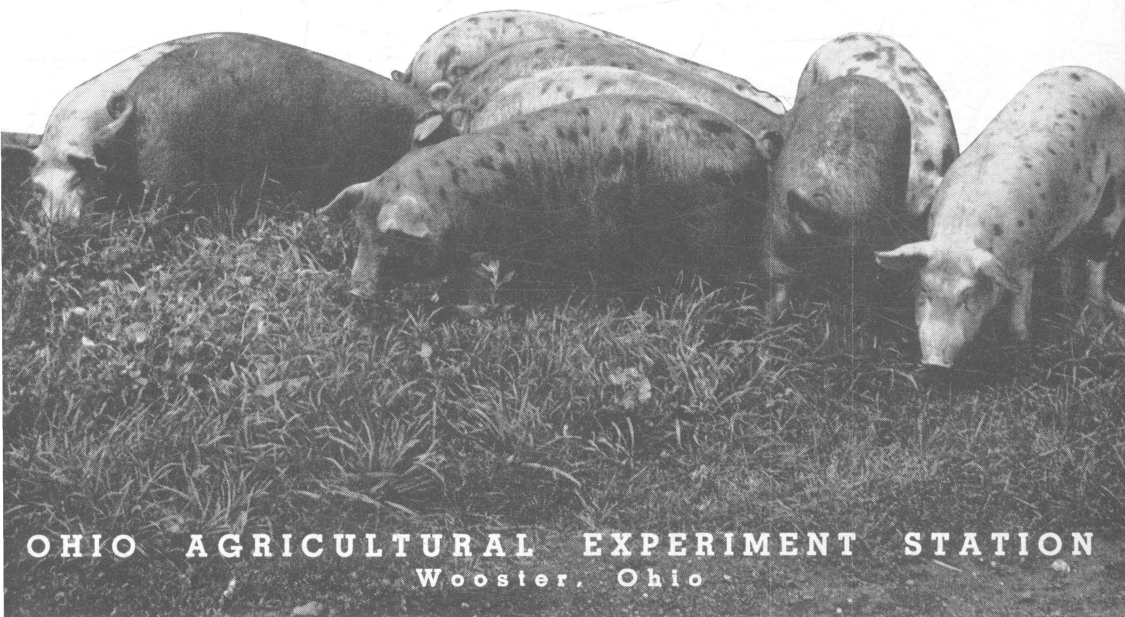


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ANALYSIS OF HOG PRICES IN OHIO

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TABLE OF CONTENTS

Source of data used	3
The price of hogs at the farm in Ohio compared to other selected states	4
Ohio hog prices at the farm by districts.....	8
Price differentials between markets	10
Annual price differentials	10
Seasonal variation	13
Price relationships between markets.....	21
Day of week variations	24
Day to day variation	25
Lack of sameness in differentials between markets.....	27
Frequency distribution of hog price differentials.....	31
Conclusions	32
Appendix A	34

ANALYSIS OF HOG PRICES IN OHIO

G. F. Henning¹

The relationship of livestock prices between markets and between areas is very important to the livestock and meat industry. In 1945 the Corn Belt Livestock Marketing Research Committee decided that a study of hog prices and market price differentials for the Corn Belt should be made. The years 1937 to 1941 were largely used for analysis since prices in that period were not influenced by the war. For the regional approach and analysis the reader is referred to that study². This publication is concerned chiefly with the situation in Ohio, not only for the prewar period but also for the war years and the period immediately following the release of price controls.

Source of Data Used

Two kinds of prices were used. One was the prices received by farmers and reported monthly by the Livestock and Crop Reporting Service of the U. S. Department of Agriculture. The other was the market prices quoted by the respective livestock markets under consideration. For Cincinnati, Indianapolis, and Chicago, the prices that were quoted by the Federal Market News Service were used. For Dayton and Columbus, the prices were taken from the daily papers quoting the markets. For Cleveland, the prices were taken from the Cleveland livestock market newspaper for the years previous to 1946 and since that time from the daily papers quoting the Cleveland Market.

If a quotation for a specific grade and weight was \$9.80 to \$10.00, the average, or \$9.90, was used as the price for that day for that specific grade. Prices for five days per week were averaged, and the weekly prices were averaged into a monthly price and then into yearly prices. For most of the analysis, market differentials were used. By differential is meant the difference in price between two hog markets of the same grade of hogs or between hogs of two grades in the same market or different markets. For example, if the price for a specific grade and weight was \$10.00 at Cincinnati and \$9.82 at Columbus, then the differential was \$0.18 for Columbus (18 cents under Cincinnati) with Cincinnati as a base. Also, if the price of 200-220 pound good to choice hogs at Cincinnati was \$10.00 and 180-200 pound good to choice hogs

¹ The writer is especially indebted to M. B. Evans of the Department of Agricultural Economics & Rural Sociology, who was responsible for the statistical analysis of this report.

² Price Differentials for Slaughter Hogs — by North Central Livestock Marketing Research Committee — Iowa Bul. P. 93, 1948.

at Cincinnati was \$9.90, then the differential was \$0.10 for the 180-200 pound group with the 200-220 pound grade as a base. There are some other comparisons that were used but these will be recognized by the reader in the different sections.

The Price of Hogs at the Farm in Ohio Compared to Other Selected States

The trend of hog prices in Ohio compared to other states is presented in Figures 1 and 2. The states of Pennsylvania, Michigan, Ken-

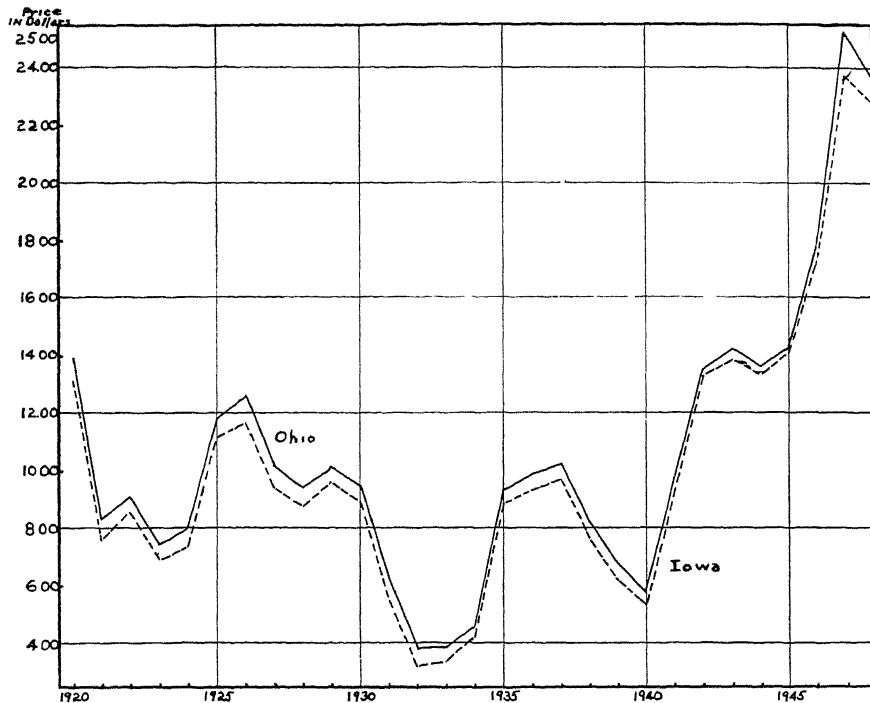


Figure 1.—Average Hog Prices Per Hundredweight Received by Farmers at the Farm in Ohio and Iowa 1920-1947.

Source: Crops and Livestock Reporting Service, U.S.D.A.

tucky, Indiana, Ohio, Illinois, Iowa, and Nebraska have been used with Indiana as a base. These states represent an eastern and western strip across the Corn Belt with Pennsylvania on the East and Nebraska on the West.

Data were used back to 1920, following World War I. Since that time numerous changes have taken place in the marketing of hogs, such

as the development of hard surfaced highways, accompanied with a big swing to motor transportation; the packing industry has decentralized and expanded in the western Corn Belt; direct marketing has developed in recent years to such an extent that more hogs are now marketed direct than through the terminal markets¹; and market information and communication, principally radio, has changed greatly in the past 25 years. Such economic forces have exerted their influence on the long time trends of hog prices.

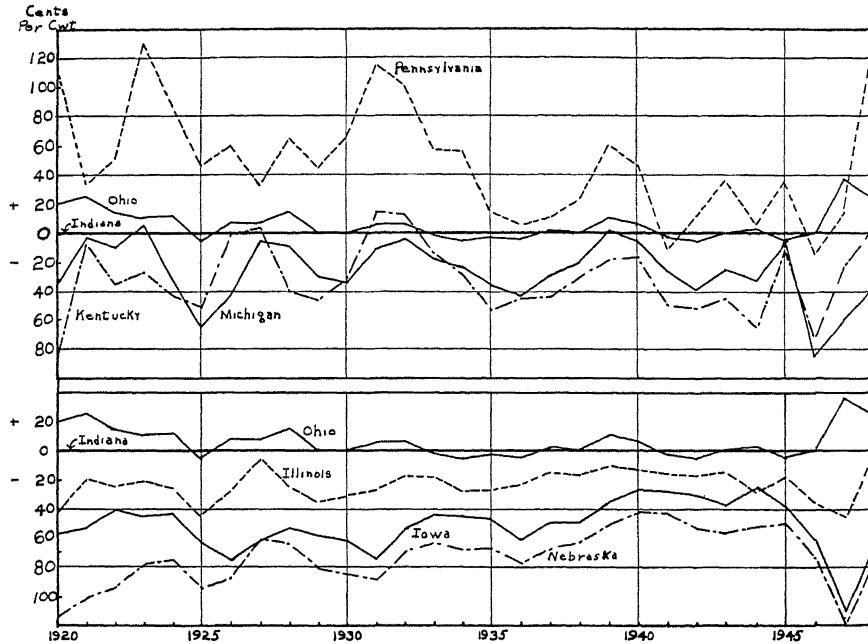


Figure 2.—Annual Hog Price Differentials at the Farm for Selected States Compared to Indiana as a Base 1920-1947.

Source: Crops and Livestock Reporting Service, U.S.D.A.

Indiana prices were used as a basis for comparison and are shown as zero in Figure 2. Ohio averaged slightly higher than Indiana until the early thirties. Then for a period of four years the Ohio price was a few cents under Indiana; also for the period during World War II, the Ohio price was just under or about the same as the Indiana price. Since 1932, only the years of 1937, 1938, 1939, 1940, 1944, 1947, 1948, and 1949 were the Ohio prices higher than Indiana.

For the 29-year period the hog prices in Illinois, Iowa, and Nebraska have been narrowing and approaching nearer to the Indiana and the

¹ Marketing livestock in the Corn Belt Region — Regional Study in 14 Corn Belt States — Bul. 365 — South Dakota State College, 1942.

Ohio prices. The Illinois price has averaged farther below the Indiana price than has the Ohio price over Indiana. For most years Iowa has been from 10 to 25 cents under Illinois. An outstanding exception was the year 1944, when the Iowa price exceeded the Illinois price by a few cents. The Nebraska price for the past 29-year period has improved with respect to the Corn Belt States to the East.

Only during the years 1946 and 1947 have the Illinois, Iowa, and Nebraska prices of hogs tended to widen away from the Ohio-Indiana prices. The year 1947 seems to be an exception to the general trend for 1948 shows a swing back to the prewar relationship. As hog production increases these variations between states will no doubt assume their former relationships.

The Kentucky and Michigan hog prices have not shown the consistent narrowing trend as have the Illinois, Iowa, and Nebraska hog prices. The ten years 1920, 1925, 1929, 1930, 1935, 1936, 1942, 1944, 1946, and 1947 have been much lower with respect to the Ohio-Indiana price than have the other years. The years 1948 and 1949 were very favorable for Michigan and Kentucky.

The 1926-1927, 1931-1932, 1939-1940, and 1945-1946 periods have been more favorable for Michigan and Kentucky hog farmers. Pennsylvania prices have shown more fluctuations than any of the other states, but the advantage to Pennsylvania farmers has almost disappeared in the last ten years. The exception was the year 1948.

Table I gives the differentials of the states with Indiana as a base for 5-year periods since 1920. In the 5-year period, 1920 to 1924, the extreme range between Pennsylvania and Nebraska was \$1.75 per cwt. For the two years, 1945 and 1946, the range was only 29 cents per cwt. for the same two states.

Illinois averaged 43 cents lower than Ohio from 1920 to 1924 and 54 cents lower in 1947 to 1948, but only 10 cents lower for 1945 and 1946.

From Figure 2 and Table 1, the reader can observe the trend in hog prices between these selected states. The influence of motor transportation, good highways, direct marketing, and railroad freight rates have all played a big part in the prices paid for livestock in the country. The Corn Belt has more nearly become one large market area. The hog processor is now able to buy at numerous assembling and concentration markets over the Corn Belt¹. This has resulted in a narrowing of hog prices.

¹ Ibid — See Figure 3, page 17. There were 998 local cooperative Associations, 1077 Auctions, 319 Concentration Markets in 14 States for the year 1941.

TABLE 1.—Hog Prices at the Farm, Averaged for 5-Year Periods, for Selected States Compared to Indiana as a Base or Zero, 1920 to 1949.

Years	Pennsylvania	Ohio	Indiana	Illinois	Iowa	Nebraska	Michigan	Kentucky
1920 to 1924	\$+0.82	\$+0.16	(\$ 9.22) \$ 0.00	\$-0.27	\$-0.48	\$-0.93	\$-0.15	\$-0.39
1925 to 1929	\$+0.50	\$+0.05	(\$10.76) \$ 0.00	\$-0.28	\$-0.63	\$-0.78	\$-0.30	\$-0.27
1930 to 1934	\$+0.79	\$+0.01	(\$ 5.63) \$ 0.00	\$-0.25	\$-0.55	\$-0.75	\$-0.18	\$-0.10
1935 to 1939	\$+0.22	\$+0.01	(\$ 8.88) \$ 0.00	\$-0.19	\$-0.58	\$-0.66	\$-0.25	\$-0.38
1940 to 1944	\$+0.18	\$-0.01	(\$11.30) \$ 0.00	\$-0.18	\$-0.30	\$-0.49	\$-0.25	\$-0.46
1945 to 1946	\$+0.04	\$-0.01	(\$16.07) \$ 0.00	\$-0.11	\$-0.20	\$-0.25	\$-0.18	\$-0.17
1947	\$+0.14	\$+0.37	(\$24.89) \$ 0.00	\$-0.45	\$-1.10	\$-1.24	\$-0.60	\$-0.23
1948	\$+1.21	\$+0.24	(\$23.53) \$ 0.00	\$-0.04	\$-0.66	\$-0.78	\$-0.39	\$-0.01
1949	\$+1.20	\$+0.35	(\$18.75) \$ 0.00	\$-0.13	\$-0.67	\$-0.60	\$-0.07	\$+0.26

Source: Crop and Livestock Reporting Service, U.S.D.A.

Note: Hog price ceilings during the war were removed in October 1946.

The average price for Indiana for the respective periods is shown above as zero representing the base.

The price for the respective states may be obtained for the period by adding or subtracting.

The differential as noted for each state is in relation to the Indiana price.

The years 1917 and 1948 have upset the normal trends that prevailed in recent years. High prices, accompanied with strong demand, favored the removal of ceilings in October, 1946 and a relative short supply of meat products, including pork, has no doubt accounted for these exceptional changes in price relationships between states in the Corn Belt. When prices and supplies approach a post war normal it is expected the hog prices at the farm for the several states will approach the prewar relationship.

Ohio Hog Prices at the Farm by Districts

In the preceding section, Ohio hog prices were compared to selected states for a period of years. In this section hog prices within Ohio are compared by Crop Reporting Districts¹, which are shown in Figure 3. District 7 is used as the base for each period because the Cincinnati market, which is located in this Crop Reporting District, is used as a base in other sections of the report. Table 2 shows the prices of hogs on an index basis averaged by 5-year periods, from 1926 to 1945 and the year 1948.

¹ These data were obtained from the Ohio Crop Reporting Service, Glenn S. Ray, Agricultural Statistician.

TABLE 2.—Index of the Prices of Hogs for Ohio by District in 5-Year Periods
(1926-1945, and 1948)
(District 7=100%)

District	1	2	3	4	5	6	7	8	9
1926 to 1930	96.3	96.9	96.9	98.2	98.2	97.9	100.0	98.0	93.6
1931 to 1935	97.0	97.6	97.9	99.0	98.1	98.3	100.0	99.1	94.8
1936 to 1940	97.6	98.1	97.2	98.8	98.8	98.2	100.0	98.7	97.3
1941 to 1945	99.2	100.2	98.9	99.6	100.3	99.7	100.0	99.1	99.7
1946 to 1947	99.0	99.6	99.8	99.7	100.5	99.2	100.0	99.4	100.1
1948	98.8	100.2	100.3	99.9	99.8	100.5	100.0	98.8	100.9

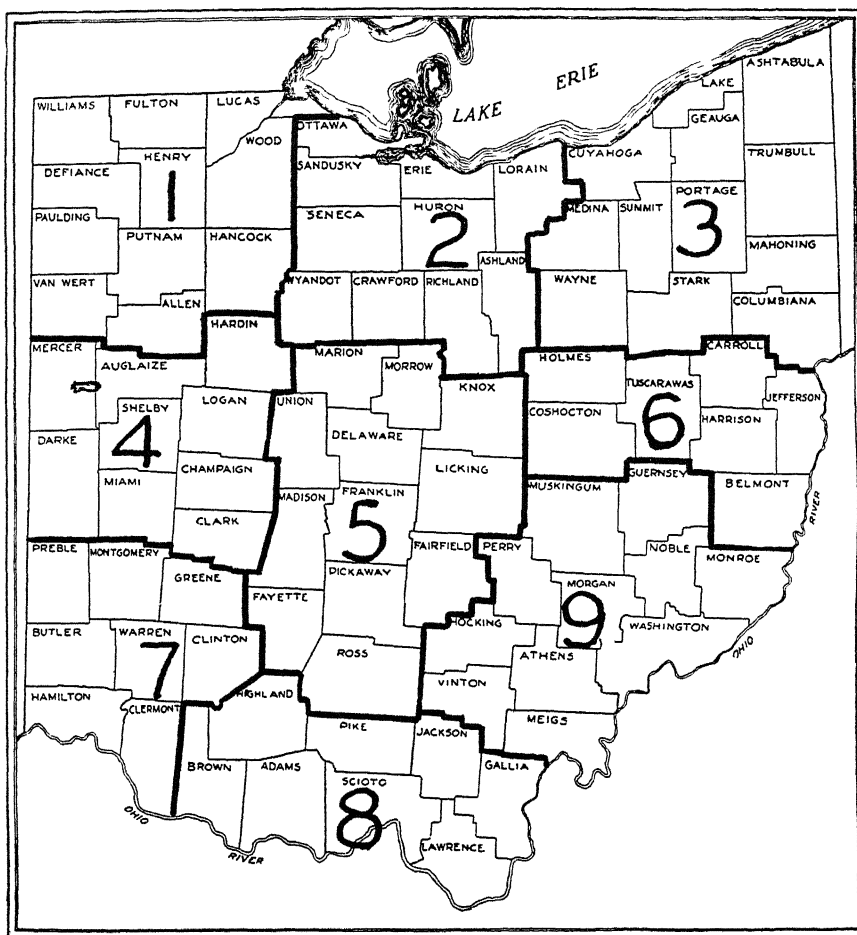


Figure 3.—Ohio Crop Reporting Districts.

By studying these data you will observe that District 9 (South-eastern Ohio) has shown the greatest relative improvement in prices in the past 20 years. In the 1926 to 1930 period, District 9 was 6.4 points under District 7, the Cincinnati area, but in 1941 to 1945 period it was only three-tenths of a point lower. In other words, the spread narrowed about six points.

Next in importance in showing improvement were Districts 2 and 1 showing 3.3 and 2.5 points, respectively. These two districts are northern and northwestern Ohio.

District 8 remained about on a level with District 7 over the 20-year

period. Districts 2 and 5 both averaged a few cents higher than District 7 during the 1941 to 1945 period.

The narrowing of the price differences between the various districts of Ohio has been due to the changes already mentioned. Improved roads, with better motor transportation, have aided considerably. The farmer now has a wider number of markets available to him than he had 25 years ago¹. By the use of the telephone or automobile, he is able to determine his best market. The radio helps him now, if he is alert, to select the more desirable markets. Then too, there has been much improvement in the agencies marketing livestock in the past 20 years. Many of the undesirable practices in livestock marketing have been eliminated, although there remains plenty of opportunity for improvement. With these factors working for improvement, farmers today have an improved price situation over what they had 20 years ago.

Price Differentials Between Markets

Market prices for hogs keep rather closely together although they vary from year to year, month to month, and day to day. Hog price differentials between markets vary, depending on geographical differences and other influences. For a description and analysis of such information, the reader is referred to the study of the Corn Belt States on Price Differentials for Slaughter Hogs¹.

Annual Price Differentials

For the important Ohio markets, Table 3 gives the annual differentials compared to Cincinnati as a base. Chicago and Indianapolis are also included for comparison. Three weight groups are given, 180-200, 200-220, and 220-240 pound good to choice barrows and gilts.

In analyzing the 180 to 200 lb. wt. group, considerable differences are shown from year to year as well as between markets, when compared to Cincinnati as a base. The Columbus yearly differential has been from 5 to 34 cents under Cincinnati. For this weight group the differential narrowed from 1937 to 1940, then widened in 1943 and narrowed again in 1944 and 1945. With the removal of ceilings in 1946, the differentials for that year and 1947 were the highest for the entire period.

¹ As of September 1949 the Ohio Department of Animal Industry reported 78 auctions, 129 concentration yards, and 38 packing companies operating stockyards in Ohio. These are in addition to the Terminal Markets at Cincinnati, Cleveland, and Dayton.

¹ Price Differentials for Slaughter Hogs—North Central Livestock Marketing Research Committee—Iowa Bul. P. 93, 1948.

TABLE 3.—Annual Hog Price Differentials of Selected Markets for Three Weight Groups Compared with Cincinnati as a Base for the Years 1937-1948.

Year	M A R K E T S A N D W E I G H T S														
	Columbus			Cleveland			Dayton			Chicago			Indianapolis		
	180 to 200	200 to 220	220 to 240	180 to 200	200 to 220	220 to 240	180 to 200	200 to 220	220 to 240	180 to 200	200 to 220	220 to 240	180 to 200	200 to 220	220 to 240
1937	\$-0.19	\$-0.18	\$-0.08	\$+0.07	\$+0.08	\$+0.08	\$-0.55	\$-0.21	\$-0.16	\$+0.24	\$+0.17	\$+0.09	\$-0.21	\$-0.12	\$-0.41
1938	-0.14	-0.07	+0.05	+0.09	+0.14	+0.14	-0.46	-0.20	-0.16	-0.17	-0.09	-0.16	-0.09	-0.08	-0.05
1939	-0.11	-0.08	+0.01	+0.07	+0.08	+0.08	-0.26	-0.23	-0.17	-0.51	-0.09	-0.03	-0.20	-0.26	-0.24
1940	-0.05	-0.11	-0.05	+0.08	+0.01	+0.01	-0.30	-0.11	-0.17	-0.19	-0.17	-0.12	-0.16	-0.17	-0.21
1941	-0.12	-0.13	-0.10	+0.08	+0.08	+0.08	-0.29	-0.16	-0.15	-0.18	-0.11	-0.01	-0.12	-0.10	-0.04
1942	-0.16	-0.12	-0.10	-0.04	+0.03	+0.05	-0.29	-0.18	-0.18	-0.18	-0.09	-0.07	-0.11	-0.06	-0.05
1943	-0.19	-0.16	-0.16	+0.07	+0.04	+0.04	-0.31	-0.24	-0.24	-0.24	-0.13	-0.12	-0.06	-0.03	-0.05
1944	-0.06	-0.11	-0.11	+0.09	+0.01	+0.00	-0.46	-0.13	-0.13	-0.22	-0.12	-0.12	-0.11	-0.08	-0.09
1945	-0.10	-0.10	-0.10	+0.06	+0.06	+0.06	-0.11	-0.11	-0.11	-0.15	-0.15	-0.18	-0.10	-0.10	-0.10
1946	-0.24	-0.25	-0.24	+0.09	+0.09	+0.09	-0.20	-0.20	-0.20	-0.18	-0.15	-0.16	-0.08	-0.09	-0.10
1948	-0.34	-0.31	-0.24	+0.08	+0.09	+0.10	-0.36	-0.32	-0.35	-0.08	-0.01	-0.07	-0.04	-0.01	-0.16
1947	-0.20	-0.15	-0.01	+0.16	+0.15	+0.31	-0.42	-0.42	-0.43	-0.12	-0.07	-0.13	-0.08	-0.11	-0.16

The 180-200 pound price differential for Cleveland was more consistently in accord with Cincinnati than was Columbus. Cleveland prices averaged somewhat higher for the period, varying only from 4 to 16 cents over Cincinnati for the different years. This analysis shows the Cleveland and Cincinnati markets moved along over the period with about the same differential from year to year.

Dayton, on the other hand, followed the pattern of Columbus for the first years of the period. Then Dayton had the same differential for about four years, but weakened in 1944, improved in 1945, and weakened again in 1948. If Dayton could hold this advantage, it would indicate that the price situation there for 180-200 pound hogs has improved over the past ten years, but 1948 seems to indicate a return to the pre war period. Dayton has been a poor livestock market since the depression of the 1930's¹.

Market interests at Dayton have been striving to improve that condition for years. It is too early to say what has been accomplished until a few more post war years have been analyzed.

The Chicago and Indianapolis markets have been added to give a comparison with the Ohio markets.

In passing over to the 200-220 pound weight group a slightly different pattern is noticed. Farm prices in 1937 and 1947 at Columbus were much lower than the in between years when compared to Cincinnati. These two years were 18 and 31 cents under Cincinnati, while intervening years were only 7 to 24 cents under.

At Cleveland, 200 to 220 pound weights were more irregular in price than the 180-200 pound group. The years 1940 and 1944 for Cleveland were barely above Cincinnati, while the years 1938, 1941, and 1946 were from 8 to 14 cents over Cincinnati. In 1948, Cleveland was 15 cents over Cincinnati.

At Dayton, the price differentials for 200-220 pound weights showed a different performance than for Cleveland and Columbus, varying from 11 cents under Cincinnati in 1940 and 1945 to 42 cents under in 1948. The years 1937 to 1939, 1943, 1946, 1947, 1948, and 1949 showed wide differentials, while 1940, 1944, and 1945 showed much narrower differentials. The three Ohio markets did not perform the same over the 13-year period. This indicates different factors at work in the different markets.

At Chicago, differentials for the 200-220 weight group varied from 17 cents under Cincinnati for the year 1937 and 1940 to only 9 cents

¹ Analysis of the Livestock Price Situation in Ohio, Henning and Poling — Mimeograph Bul. 101, Ohio Expt. Station — O.S.U. — 1937. Now out of print.

for 1938, 1939, and 1942, but for most years the differential was from 11 to 15 cents. The Chicago and Cincinnati markets kept in line with one another.

If the years 1939 and 1940 are omitted, the Indianapolis differential for the 200-220 pound weights kept in line with Cincinnati.

For the heavier weight hogs—220-240 pounds—the differentials acted differently than for the weights up to 220 pounds. For Columbus the differential was almost the same as Cincinnati for the three years 1937 to 1939. Then the differential widened with a slight change for the recent years or about 15 cents under Cincinnati. While Cleveland was higher, a similar pattern for Columbus was evident for most years. The Chicago market was somewhat similar to Cleveland and Columbus, except for the years 1943 and 1946, 1947, and 1948. Dayton followed Cincinnati very closely, averaging about 21 cents under Cincinnati.

Seasonal Variation

Hog prices vary from season to season, month to month, and between markets. The various grades also show considerable differences seasonally between markets and within markets. For this part of the study, the five years 1937-1941 and the two years of 1947-1948 were used as averages. This pre-war period—1937-1941—is probably as good a period as any that can be used in the past 15 years, and the performance of markets and prices may be useful for comparisons in the post war period. The 1947-1948 period is indicative of the adjustment to the post war period.

To show how the actual prices have averaged from month to month over these periods, Figure 4 and Table 4 are presented. This gives the average prices for good to choice 180 to 200, 200 to 220, and 220 to 240 pound barrows and gilts on the Cincinnati market. This is the typical seasonal price pattern for hogs: low in the months of November and December, a slight rise to February, a slight decline to April, and then a decided rise to the summer peak from July to September. This is the normal price pattern by seasons for most years, and livestock farmers should keep this average seasonal movement in mind when marketing hogs. However, any one year may not follow this normal or average price pattern. If hog supplies are increasing or decreasing, the seasonal pattern may be different from the normal. Demand factors, such as increasing or decreasing employment over a 12-month period, will influence the price pattern for any particular year. If the nation is entering or coming out of a business depression, such economic forces will change the normal pattern.

Cincinnati was used in Figure 4 because in this study, the Cincinnati market, or the southwestern Ohio area has been used as the base.

TABLE 4.—The Two Year Average Price (1947-1948) Per Hundredweight for Good to Choice Hogs at the Cincinnati Market for 180-200, 200-220, and 220-240 Pound Weight Groups.

Month	Cincinnati		
	180-200 lbs	200-220 lbs.	220-240 lbs.
January	\$25.74	\$25.74	\$25.54
February	25.66	25.66	25.39
March	25.66	25.66	25.52
April	23.32	23.32	23.16
May	23.34	23.34	23.22
June	25.64	25.64	25.57
July	28.44	28.44	28.36
August	28.98	28.98	28.96
September	28.73	28.73	28.74
October	27.08	27.08	27.11
November	24.40	24.40	24.40
December	24.99	24.99	24.96

Hence, in additional comparisons, other markets will be compared to Cincinnati. Figure 5 shows how the 200-220 pound price at Cleveland, Columbus, Dayton, Chicago, and Indianapolis compare to Cincinnati. To understand this graph, an illustration may help. In Figure 4 the 5-year average Cincinnati price for 200-220 pound hogs for January was \$8.28. In Figure 5 the figure \$8.28 becomes zero for January. The 5-year average price for Cleveland for January was \$8.38, or 10 cents over the Cincinnati price. In Figure 5 with Cincinnati as a base or zero, the Cleveland price is plus 10 cents which means the Cleveland price for the period under consideration is 10 cents higher than Cincinnati. This same scheme is followed for February and the other months. This is done in order to show more clearly the differences by months between markets. The reader will observe from Figure 5 that the Cleveland price for the 5-year period almost paralleled the Cincinnati price except for the month of March. The price at Cleveland for the different months averaged from 1 to 12 cents over the corresponding period at Cincinnati for the 200 to 220 pound good to choice grade.

There was more variation for the years 1947 and 1948; especially February, May, October, and November, (Table 5).

The Columbus and Dayton markets averaged lower than Cincinnati. Columbus usually was higher than Dayton. The months of March, April, May, and June were exceptions when Dayton was only slightly under Columbus. The pattern for Columbus was slightly different than for Dayton, as shown in Figure 5. The price on 200-220 hogs was definitely weaker at Dayton for the winter months of November, December, and January. Table 5 shows some slight differences. Apparently,

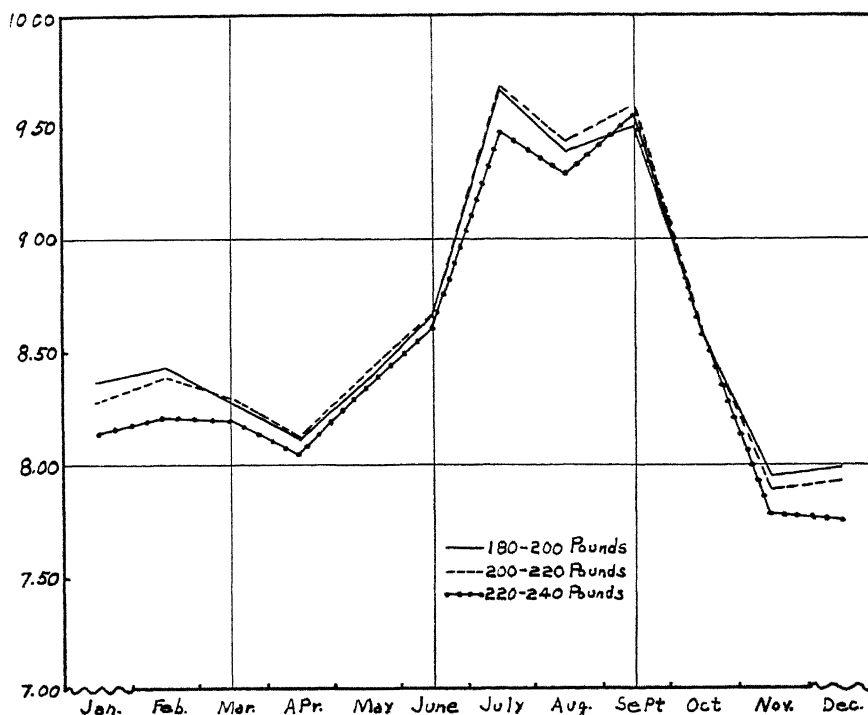


Figure 4.—The Five Year Average Price (1937-1941) Per Hundredweight for Good to Choice Hogs at the Cincinnati Market.

outlets or demand was not as good for the Dayton market for the winter months as compared to the other Ohio markets. This situation should be the concern of the market interests on the Dayton market.

In Figure 5 Indianapolis and Chicago are given for the same 200-220 pound weights to show how these important markets average with Cincinnati for the 5-year pre-war period. Chicago averaged below Cincinnati and has a somewhat different seasonal pattern than any of the other markets presented in Figure 5. Indianapolis followed the same seasonal pattern as Cincinnati except the rise was faster in May and slower in June and July, and the fall was faster in October. This same seasonal pattern is not borne out in the 2-year 1947-1948 period. We need more years to establish the post war relationships.

This graph brings out the average seasonal differences between markets for the same weight and grade of hogs. It shows how the forces of competition and factors of supply and demand change the price relationships between markets for the similar grade and weight of hogs.

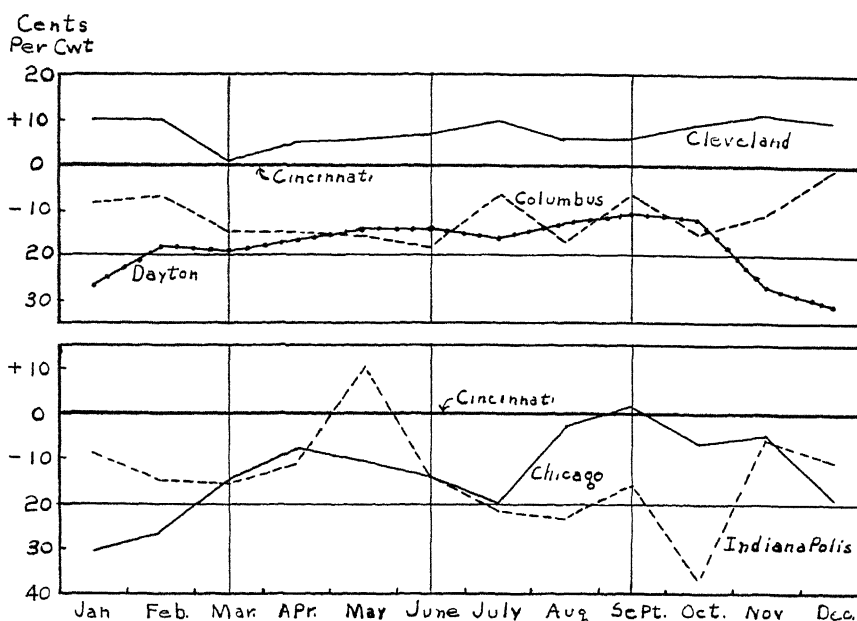


Figure 5.—The Five Year Average Price Differentials (1937-1941) Per Hundredweight for 200-220 Pound Good to Choice Hogs for Selected Markets Compared to 200-220 Pound Weight Group as a Base (Zero in above Graph).

Figures 6 and 7 give the seasonal pattern for 180-200 and 220-240 pound good to choice hogs. The Cincinnati market has the same seasonal pattern as for the medium weight 200-220 pound hogs. Cleveland and Columbus follow much the same seasonal pattern except for the month

TABLE 5.—The Two Year Average Price Differentials (1947-1948) Per Hundredweight for 200-220 Pound Good to Choice Hogs for Selected Markets Compared to 200-220 Pound Weight Group at Cincinnati as a Base.

Month	Cleveland	Columbus	Dayton	Chicago	Indianapolis
January	+.13	-.26	-.22	-.12	+.04
February	+.02	-.32	-.18	-.18	-.14
March	+.29	-.21	-.24	+.10	+.06
April	+.18	-.12	-.18	+.23	+.12
May	+.40	-.10	-.17	+.16	-.01
June	+.28	-.18	-.19	-.16	-.10
July	+.07	-.10	-.32	-.31	-.08
August	+.31	-.16	-.45	+.04	-.04
September	+.20	-.26	-.44	-.18	-.11
October	+.06	-.20	-.46	-.02	-.14
November	-.40	-.20	-.45	-.21	-.10
December	-.08	-.06	-.28	-.29	-.10

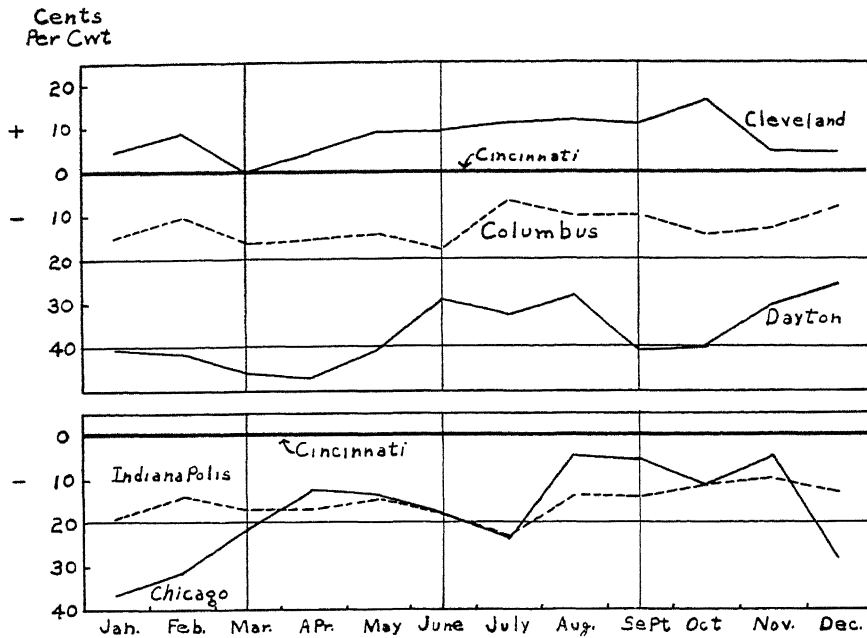


Figure 6.—The Five Year Average Price Differentials (1937-1941) Per Hundredweight for 180-200 Pound Good to Choice Hogs for Selected Markets Compared to 180-200 Pound Weight Group as a Base (Zero in above Graph).

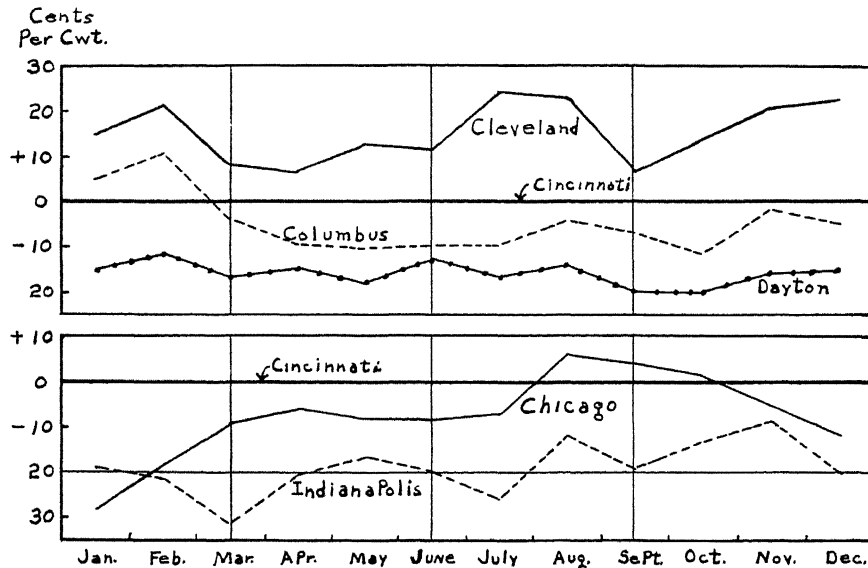


Figure 7.—The Five Year Average Price Differentials (1937-1941) Per Hundredweight for 220-240 Pound Good to Choice Hogs for Selected Markets Compared to 220-240 Pound Weight Group as a Base (Zero in above Graph).

of October, although the Columbus market is several cents under the Cleveland market. Dayton, which is under the Columbus market, has a different pattern. The 180-200 pound grade is higher relatively from June through August and in December, while lower in March, April, September, and October.

Indianapolis follows much the same pattern as Cincinnati with a few exceptions. The 180 to 200 pound group at Chicago is lower relatively for December, January, February, and July than the other months. The relatively high months are August, September, and November.

The 1947-1948 period shows that Columbus and Dayton have a very weak market for the 180-200 pound hogs during the early fall months compared to Cincinnati and the other markets. The late spring and summer months were better. Cleveland had a poor light hog market during November.

For the 220-240 pound hogs, Columbus was strongest during the late spring and early summer months in two post war years, compared to Cincinnati. Dayton followed a similar pattern, although the prices were lower. The months of August through November were not good at Dayton. Cleveland has had an exceptionally strong 220-240 pound market for the first nine months of the two post war years. However, November and December were not good.

Another interesting comparison is the differentials between grades in the same market. Do the grades in the same market have the same spread or difference as they do in other markets? This information is given in Table 8. The 200 to 220 pound weight group is used for each market as the base throughout, or zero in the table. That is, if the five-year average price for 200 to 220 hogs at Cleveland for the month of January is \$10.00, then the price for 180 to 200 pounds for January at Cleveland is plus 3 cents, or \$10.03. Similarly, the prices for other months and markets are determined. The comparisons are all between grades within the same market.

Table 8 shows that all markets are not the same, as far as the 1937-1941 (5-year period) is concerned. At Dayton, the 180-200 pound weights were the same as the 200 to 220's. At Columbus, they averaged the same for each of the six months, February through July. For Cleveland, the 180 to 200 pound group were the same for April, May, and September; for Cincinnati, only April, June, and July. For Chicago, the months of January and November were above the 200 to 200 pound group and the other months were below, with September averaging 14 cents under.

TABLE 6.—The Two Year Average Price Differentials (1947-1948) Per Hundred-weight for 180-200 Pound Good to Choice Hogs for Selected Markets Compared to 180-200 Pound Weight Group at Cincinnati as a Base.

Month	Cleveland	Columbus	Dayton	Chicago	Indianapolis
January	+.14	-.26	-.22	-.13	+.04
February	+.02	-.32	-.18	-.18	-.05
March	+.29	-.21	-.24	+.10	+.08
April	+.18	-.12	-.18	+.22	+.12
May	+.42	-.10	-.16	+.18	.00
June	+.28	-.18	-.19	-.17	-.08
July	+.07	-.10	-.32	-.33	-.08
August	+.33	-.15	-.45	-.14	-.10
September	+.11	-.56	-.46	-.12	-.20
October	+.06	-.42	-.58	-.26	-.26
November	-.40	-.20	-.48	-.26	-.11
December	-.08	-.06	-.28	-.22	-.08

At Indianapolis, the light weight hogs were higher for February, November, and December and lower for the other months. The 180 to 200 pound group showed more variation over the 200 to 220's at Indianapolis than any of the markets compared, being 6 cents over in February and 27 cents under in May, or an extreme spread of 33 cents compared to 200 to 220 pound hogs. Chicago was next with a 22 cents spread between September and November.

Switching to the heavier hogs, 220 to 240 pounds, one observes still different patterns. At Columbus, this weight group sold at the same price as the 200 to 220's, except for January and August when they sold at a

TABLE 7.—The Two Year Average Price Differentials (1947-1948) Per Hundred-weight for 220-240 Pound Good to Choice Hogs for Selected Markets Compared to 220-240 Pound Weight Group at Cincinnati as a Base.

Month	Cleveland	Columbus	Dayton	Chicago	Indianapolis
January	+.30	-.07	-.25	-.11	-.14
February	+.28	-.06	-.24	-.13	-.14
March	+.43	-.06	-.30	+.03	-.08
April	+.31	+.02	-.20	+.14	-.05
May	+.52	+.02	-.17	-.02	-.15
June	+.35	.00	-.22	-.34	-.14
July	+.11	-.04	-.26	-.47	-.18
August	+.34	-.12	-.43	.00	-.08
September	+.20	-.26	-.45	+.26	-.06
October	+.06	-.20	-.48	+.04	-.02
November	-.40	-.21	-.45	-.25	-.34
December	-.08	-.18	-.30	-.50	-.59

TABLE 8.—The Five Year Average Seasonal Hog Price Differentials for Various Markets Compared Within the Market with 200-220 Pounds as the Base Weight.

(1937-1941)

Month	Cleveland			Columbus			Cincinnati		
	180	200	220	180	200	220	180	200	220
	to 200	to 220	to 240	to 200	to 220	to 240	to 200	to 220	to 240
Jan.	\$ +0.03	\$ 0.00	\$ -0.10	\$ +0.02	\$ 0.00	\$ -0.02	\$ +0.09	\$ 0.00	\$ -0.15
Feb.	+0.01	0.00	-0.06	0.00	0.00	0.00	+0.04	0.00	-0.18
Mar.	+0.01	0.00	-0.03	0.00	0.00	0.00	+0.02	0.00	-0.12
Apr.	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	-0.06
May	0.00	0.00	+0.03	0.00	0.00	0.00	-0.02	0.00	-0.03
June	+0.01	0.00	-0.03	0.00	0.00	0.00	0.00	0.00	-0.08
July	+0.01	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	-0.18
Aug.	+0.04	0.00	+0.02	0.02	0.00	-0.02	-0.04	0.00	-0.12
Sept.	0.00	0.00	0.00	-0.02	0.00	0.00	-0.06	0.00	-0.01
Oct.	+0.01	0.00	0.00	-0.04	0.00	0.00	-0.03	0.00	-0.03
Nov.	+0.01	0.00	0.00	+0.02	0.00	0.00	+0.07	0.00	-0.10
Dec.	+0.03	0.00	-0.04	+0.02	0.00	0.00	+0.07	0.00	-0.16
Average	+0.01	0.00	-0.02	0.00	0.00	0.00	+0.01	0.00	-0.10

Month	Dayton			Chicago			Indianapolis		
	180	200	220	180	200	220	180	200	220
	to 200	to 220	to 240	to 200	to 220	to 240	to 200	to 220	to 240
Jan.	\$ 0.00	\$ 0.00	\$ -0.13	\$ +0.03	\$ 0.00	\$ -0.13	\$ -0.01	\$ 0.00	\$ -0.28
Feb.	0.00	0.00	-0.15	-0.02	0.00	-0.10	+0.06	0.00	-0.24
Mar.	0.00	0.00	-0.07	-0.05	0.00	-0.04	-0.02	0.00	-0.31
Apr.	0.00	0.00	-0.04	-0.04	0.00	-0.03	-0.04	0.00	-0.23
May	0.00	0.00	-0.05	-0.05	0.00	-0.01	-0.27	0.00	-0.15
June	0.00	0.00	-0.08	-0.04	0.00	-0.01	-0.05	0.00	-0.20
July	0.00	0.00	-0.17	-0.04	0.00	-0.05	-0.02	0.00	-0.30
Aug.	0.00	0.00	-0.12	-0.08	0.00	-0.05	-0.14	0.00	-0.05
Sept.	0.00	0.00	-0.03	-0.14	0.00	+0.01	-0.03	0.00	-0.06
Oct.	0.00	0.00	-0.01	-0.11	0.00	+0.02	-0.05	0.00	+0.02
Nov.	0.00	0.00	-0.06	+0.08	0.00	+0.01	+0.02	0.00	-0.15
Dec.	0.00	0.00	-0.10	-0.01	0.00	-0.08	+0.05	0.00	-0.26
Average	0.00	0.00	-0.08	-0.04	0.00	-0.04	-0.04	0.00	-0.18

slight discount. At Dayton, the months of December, January, February, and July were 10 to 17 cents under the medium weight group. There were three periods, April, September, and October, when the heavier hogs sold for nearly the same price as 200-220's.

Cincinnati had a similar pattern to Dayton for the 220 and 240 pound group. At Cleveland the heavy hogs sold slightly above the 200-220's for May and August. During December, January, and February they sold from 4 to 10 cents under the 200-220's. At Chicago, the 220 to 240 pound hogs sold little above the 200-220 pound class during September, October, and November, and sold under them for the remaining months of the year.

This analysis brings out the different characteristics that exist in markets. Farmers should take account of these differences in marketing hogs of different weights. It has been stated thus in farmer language: "If I have light hogs, the packers want them heavy, and if I have them heavy they want them light." Some markets show wider swings than others. Of course, part of this is explained by the movement of hogs to market. In the late winter months, hogs have been longer fed and many of them are heavy, whereas in the late summer most of the heavy hogs have been marketed. The supply of corn and number of hogs also enters into the weights that are produced by farmers, but considering these factors, the different markets respond differently to differentials between weight grades. It would seem that some markets are in a position to do a better job of marketing, have more desirable outlets and secure for their farmer patrons a larger return under similar conditions, than do other markets.

Price Relationships Between Markets

Price relationships between markets are of interest to livestock marketing groups and farmers. The question that frequently arises is whether or not the price in one market moves in the same direction the same day as the price in another market.

Table 9 shows this relationship of hog prices for 200-220 lbs. hogs between Columbus, Cleveland, and Indianapolis with Cincinnati as the base for the year 1941.

There are some striking differences in price movement in this table. For instance, when the price of hogs at Cincinnati rose from the previous day, Cleveland increased the same day only 53 percent of the time as compared to 86 percent and 88 percent at Columbus and Indianapolis, respectively.

When the price at Cincinnati remained the same as the previous day, Cleveland remained the same only 29 percent of the time, decreased

TABLE 9. — The Price Relationships for 200-220 lb. Hogs Between Various Markets for the Year 1941.

When the Cincinnati Price	Columbus Price			Cleveland Price			Indianapolis Price		
	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time
Increased	86	12	2	53	31	16	88	9	3
Remained the Same	32	61	7	44	29	27	21	51	38
Decreased	2	6	91	7	43	50	1	9	90

The Price Relationships for 200-220 lb. Hogs Between Various Markets for the Year 1948.

When the Cincinnati Price	Columbus Price			Cleveland Price			Indianapolis Price		
	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time
Increased	77	14	9	61	23	16	77	8	15
Remained the Same	34	20	46	36	38	26	32	22	46
Decreased	9	17	74	13	26	61	8	8	84

The Price Relationships for 200-220 lb. Hogs Between Various Markets for the Year 1949.

When the Cincinnati Price	Columbus Price			Cleveland Price			Indianapolis Price		
	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time
Increased	59	29	12	54	29	17	68	10	22
Remained the Same	33	50	17	42	33	25	33	33	34
Decreased	16	27	57	18	30	52	20	20	60

27 percent and increased 44 percent of the time. Columbus and Indianapolis remained the same 61 percent and 51 percent of the time, respectively.

In Table 9, when the price at Cincinnati decreased from the previous day, the Cleveland price decreased only 50 percent of the time as compared to 91 percent and 90 percent decreases at Columbus and Indianapolis.

If the markets at Columbus, Indianapolis, and Cleveland had fallen 100 percent of the time this would have been a perfect correlation. It must be remembered that this analysis only applies to the next market day. Markets do not stay out of line very long, but sometimes do get out of line for a few days.

This table indicates that the markets at Columbus and Indianapolis tend to move generally in the same direction as the Cincinnati market, while Cleveland shows wider variation and more independence of action.

From these data it can be seen that the factors influencing the movement of prices at Cincinnati do not react in the same way the same day in the Cleveland market. Both Columbus and Indianapolis tend to move up and down together in price with Cincinnati. This means then that the Cleveland market tends to move more independently than the other markets, and may fluctuate in opposite directions.

Table 10 shows the relationship for hog prices for 200-220 pound hogs between Columbus and Cleveland with Indianapolis as the base for the year 1941.

The most interesting feature this table brings out is when the price at Indianapolis *decreased* from the previous market day the price at Cleveland *increased* 48 percent of the time and decreased only 17 percent of the time. Yet at Columbus the price increased 5 percent of the time and decreased 78 percent of the time.

This table further supports the findings in Table 9 and the conclusions are the same—that the Cleveland market still moves independently of these other markets and fluctuates differently.

In both Tables 9 and 10, 1948 and 1949 are compared with 1941. It is interesting to note from these tables some shifting relationships. Columbus in 1948 showed less correlation with Cincinnati than during 1941. The same was true for Indianapolis. However, Cincinnati and Cleveland showed a tendency to move in the same direction more often in 1948 than 1941.

When Cleveland was compared with Indianapolis the 1948 market showed a more correlated market than 1941. The reverse was true for Columbus.

TABLE 10.—The Price Relationships for 200-220 lb. Hogs Between Various Markets for the Year 1941.

When the Indianapolis Price	Columbus Price			Cleveland Price		
	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time
Increased	84	15	1	57	28	15
Remained the Same	40	38	22	25	43	32
Decreased	5	17	78	48	34	17

The Price Relationships for 200-220 lb. Hogs Between Various Markets for the Year 1948.

When the Indianapolis Price	Columbus Price			Cleveland Price		
	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time
Increased	83	9	8	61	24	15
Remained the Same	33	34	33	27	46	27
Decreased	10	17	73	17	25	58

The Price Relationships for 200-220 lb. Hogs Between Various Markets for the Year 1949.

When the Indianapolis Price	Columbus Price			Cleveland Price		
	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time	Increased Percent of Time	Remained the Same Percent of Time	Decreased Percent of Time
Increased	63	29	8	52	34	14
Remained the Same	32	45	23	23	42	35
Decreased	15	17	68	22	19	59

Some mathematical comparison will be shown later, but this shows that Columbus tends to move more closely with Indianapolis and Cincinnati than does Cleveland.

Day of Week Variations

Farmers often argue about the best day of the week to market livestock. Table 11 gives the averages for three periods, 1937-1941, 1942-1945, and for 1948 for the three Ohio markets. On the average there is little to choose between days of the week. Monday for all three markets has proven to be a good market day, although Friday is as good at Cincinnati and nearly as good at Columbus. Tuesday at Cleveland, Wednesday at Columbus, and Tuesday and Thursday at Cincinnati were

TABLE 11.—Average Yearly Hog Prices by Day of Week for 200-220 Pound Hogs for Selected Ohio Markets and Selected Periods.

Market	Five Year Average 1937-1941				
	Monday	Tuesday	Wednesday	Thursday	Friday
Columbus	\$8.49	\$8.46	\$8.45	\$8.46	\$8.48
Cincinnati	8.60	8.57	8.58	8.57	8.60
Cleveland	8.70	8.65	8.67	8.68	8.66

Market	Four Year Average 1942-1945				
	Monday	Tuesday	Wednesday	Thursday	Friday
Columbus	14.39	14.38	14.41	14.41	14.38
Cincinnati	14.53	14.50	14.50	14.50	14.52
Cleveland	14.56	14.56	14.56	14.56	14.55

Market	1948				
	Monday	Tuesday	Wednesday	Thursday	Friday
Columbus	25.52	25.41	25.51	25.61	25.38
Cincinnati	25.79	25.58	25.67	25.69	25.73
Cleveland	25.38	25.53	25.56	25.72	25.60

the low periods of the week. The difference for the 5-year 1937-1941 period between the high and low day at Cleveland was 5 cents, and only 4 cents at Cincinnati and Columbus.

For the war period there was a different pattern, especially at Columbus, as Wednesday and Thursday were high days. Cleveland was the same except for Friday, which averaged one cent lower. At Cincinnati, the low days on the average were Tuesday and Wednesday. This points out that there is little to choose as far as days of the week are concerned. However, in some particular week or month, a certain day may be unusually high or low. Unusual market situations or combinations may make a good market or a bad one. Farmers, in selecting a particular day to market should study and observe the market and watch for the unusual market situations. In this manner, the unfavorable situations may be avoided.

Day to Day Variation

Another aspect of hog markets to keep in mind is how markets change from day to day. How much are these price changes? Does a market go up one day and down the next, or what is the pattern?

One aspect of this is shown in Figure 8. The Cincinnati market for the months of August and September for the years 1937, 1941, and 1948

was selected to illustrate this aspect of price movement. In 1937 the market was \$13.35 on August 1 and \$12.25 on September 30. Therefore, over the period the market dropped \$1.10. To illustrate the graph let us start with August 1, 1937. On August 2 the price rose 20 cents. The next day the market rose 15 cents, and the following day remained the same. Each day is compared to the previous day, which is considered zero. Therefore, all the shaded area below the zero line represents price declines from the previous day, while the area above the zero line represents price rises. The same period for 1941 and 1948 are shown. These three periods illustrate fairly well how the hog market performs.

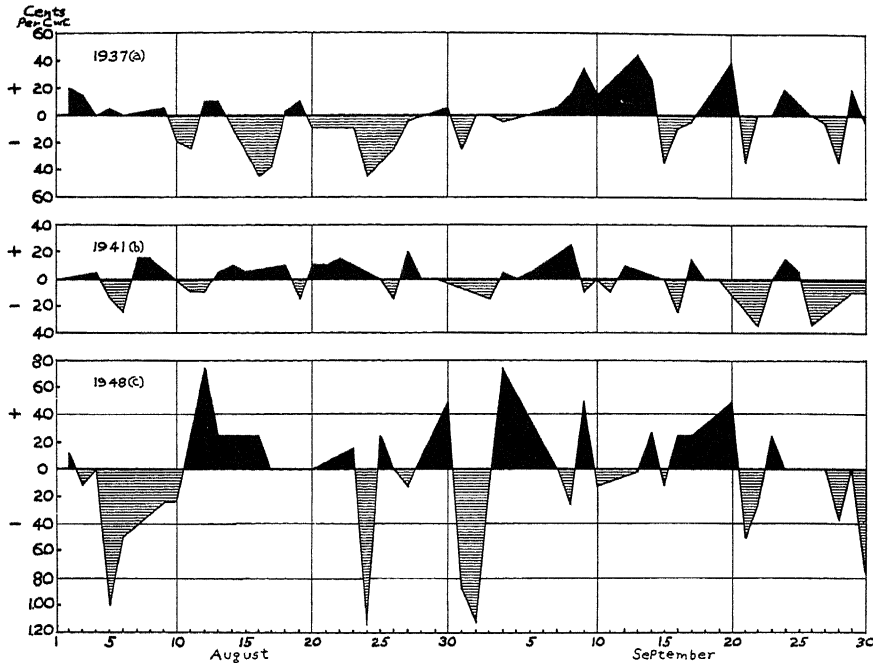


Figure 8.—Day to Day Variation of Prices at the Cincinnati Market During August and September, 1937, 1941, and 1948.

This analysis also shows how erratic the hog market is from day to day. Seldom did the market remain the same. It either went up or down. It is through this method that the supply of hogs and the demand for pork is equated through our livestock markets of the nation.

During the war, when ceilings were in operation and prices were pushed up against the ceilings, there were no changes from day to day,

because the price remained the same. However, with the removal of ceilings in 1946, prices again resumed their daily fluctuation.

The analysis of 1947 prices (not included) shows similar patterns to the 1941 changes. However, the price changes are greater, involving frequent changes of 50 cents or more from the previous day. This is explained chiefly by the fact that the price in 1947 was over two and one-half times the price in 1941.

The 1948 pattern for August and September was little different than the other years except the market trend was downward being nearly \$3.00 lower on September 30 as compared to the first market day of August. There were three days when the market changed \$1.00 or more and four more days when it changed 75 cents to \$1.00. While these changes seem large, they are no larger than 25 to 35 cents for \$10.00 hogs.

The main point to remember about the hog market is that it changes frequently, often from day to day. It is not stable over a period of time like the price of an automobile, tractor, or fertilizer. There are advantages and disadvantages to such a freely changing market price. Further analysis of daily changes will be given in another section.

Lack of Sameness in Differentials Between Markets

It is interesting to know how often the differentials between two markets remained the same or changed and for what periods of time. The pattern for the years since 1937 are presented for the Columbus and Cleveland markets compared to Cincinnati, Tables 12 and 13. This is important to farmers who are located about half way between two or more markets. They may choose one or the other depending on the better market.

An illustration will help to explain these tables. Assume daily prices at Cincinnati for a 5-day period and the same grade of hogs were \$10.00, \$10.10, \$10.10, \$10.20, and \$10.00, and at Cleveland for the same period were, respectively, \$10.15, \$10.20, \$10.20, \$10.25, and \$10.15. For the first day the differential (the difference between the markets) was 15 cents, the second day 10 cents, the third day 10 cents, the fourth day 5 cents, and the fifth day 15 cents. During this 5-day illustration the differential remained the same for only one two-day period. The other days the differential remained the same for only one day.

In 1937, for the Cleveland and Cincinnati comparison, there were 191 times during the year when the differential remained the same for only one day; 25 times when the differential remained the same for two

TABLE 12.—Number of Consecutive Days Price Differentials for Hogs Weighing 200-220 lbs. Between Columbus and Cincinnati Has Remained the Same, 1937 to 1946.

No. of Days	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
1	179	167	167	163	94	142	93	48	7	76
2	25	18	20	20	31	39	25	12	1	3
3	4	2	12	8	17	10	10	3	—	1
4	1	—	1	2	5	1	7	2	—	—
5	—	—	1	2	0	—	3	2	—	—
6	—	—	—	—	2	—	1	—	—	1
7	—	—	—	—	1	—	—	—	—	—
8	—	—	—	—	—	—	1	—	—	—
13	—	—	—	—	—	—	1	—	1	—
18	—	—	—	—	—	—	—	1	—	—
27	—	—	—	—	—	—	—	—	—	1
38	—	—	—	—	—	—	—	—	1	—
64	—	—	—	—	—	—	—	1	—	—
66	—	—	—	—	—	—	—	1	—	—
177	—	—	—	—	—	—	—	—	—	1
188	—	—	—	—	—	—	—	—	1	—
Number of market days	245	209*	252	245	246	254	243	247	248	235

*Market reports were missing for a number of days — not quoted in newspapers.

TABLE 13.—Number of Consecutive Days Price Differentials for Hogs Weighing 200-220 lbs. Between Cleveland and Cincinnati Has Remained the Same, 1937 to 1946.

No of Days	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
1	191	195	163	150	174	159	143	81	7	78
2	25	23	31	32	30	35	34	7	2	3
3	1	3	5	10	3	6	3	3	—	1
4	—	1	2	2	1	1	—	2	—	—
5	—	—	1	—	1	—	—	—	—	—
6	—	—	—	—	—	1	—	—	—	1
7	—	—	—	—	—	—	1	—	—	—
10	—	—	—	—	—	—	1	—	—	—
13	—	—	—	—	—	—	—	—	1	—
16	—	—	—	—	—	—	—	1	—	—
19	—	—	—	—	—	—	1	—	—	—
22	—	—	—	—	—	—	—	1	—	—
29	—	—	—	—	—	—	—	—	—	1
35	—	—	—	—	—	—	—	—	1	—
41	—	—	—	—	—	—	—	1	—	—
65	—	—	—	—	—	—	—	1	—	—
115	—	—	—	—	—	—	—	—	—	1
191	—	—	—	—	—	—	—	—	1	—
Number of market days	244	254	253	252	252	257	256	256	250	237

days; and once when the differential remained the same for three days, making 244 market days.

The differentials between Cincinnati and Columbus for the years 1937 through 1940 were characterized by changing from day to day. In 1937 there was one period when the differential did not change for four days. In 1939 there was one period of five days. There were from 18 to 25 times when the differential remained the same for a 2-day period and from 2 to 12 times for a 3-day period.

During the war period with market controls in operation the differentials remained the same for much longer periods. Look at the year 1945, Table 13.

Here we see a much different relationship. There were seven times when the differential remained the same for only one day; and once when the differential remained the same for 191 days, and in 1946 for 115 days.

This change can be largely accounted for by the fact that price ceilings during World War II were in effect, thus forcing the markets to quote the same prices and hence the differentials between the two markets remained the same for a longer period of time.

When Cincinnati and Cleveland are examined closely the same pattern is shown as existed between Cincinnati and Columbus, except Cleveland tended to change more from day to day than Columbus in comparison to Cincinnati. The war period was much the same as for Columbus and Cincinnati.

During 1946 there was a tendency to revert back to more changes in the differential as shown by the years 1937, 1938, 1939, 1940, and 1942.

The post war period for Cleveland and Columbus compared with Cincinnati were very much alike.

This analysis emphasizes the fact that Ohio hog markets are characterized by changes in different degree. They do not move together but move independently. Seldom do they have the same differential more than two days in succession. It is this characteristic of markets that buyers and sellers must watch. The markets do not get far apart yet their changes are not uniform. They are much like the waves on a large lake going up and down, some higher than others. The same is true for livestock markets. They move up and down, not together but not far apart.

During the prewar period our markets were characterized by changing differentials. There were only a relatively few periods when the differential between two markets remained the same for three days or

longer. Most of the time the markets changed every day. This is what can be expected in the post war period. As we move farther away from war controls and return to a pattern of livestock prices similar to the 1937-41 period, it is likely that the differentials between markets will likewise be similar to the 1937-1941 period.

Frequency Distribution of Hog Price Differentials

Another aspect of how daily prices perform is shown by a frequency distribution analysis. For example, if one day Columbus is 10 cents per cwt. under Cincinnati, a second day 20 cents, and a third day 15 cents under Cincinnati, etc., then one may group all the days under comparison into such groups. This grouping is presented in Figure 9. Both Columbus and Cleveland are presented together. The five years, 1937 to 1941, have been grouped together. A different pattern for each market may be noted on this graph.

Columbus has a definite peak whereas Cleveland had no definite peak. In slightly more than 26 percent of the days, the Columbus market was 10 cents under the Cincinnati market. This was the most common differential. About 20 percent of the days Columbus was

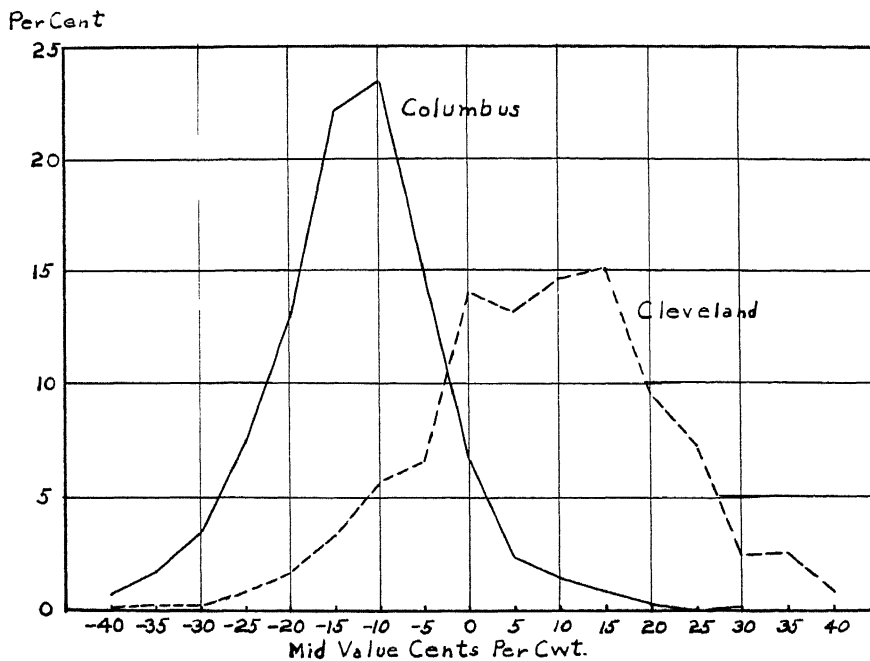


Figure 9.—Five Year Frequency Distribution of Daily Hog Price Differentials, Columbus and Cleveland 200-220 Pound Hogs Compared with Cincinnati 200-220 Pounds as a Base, 1937-1941 (Zero is equal to same price as Cincinnati).

15 cents under Cincinnati and 16 percent of the days 5 cents under. In other words, the Columbus market was either 5, 10 or 15 cents under the Cincinnati market 63 percent of the market days. Further analysis of the curve shows some wide and erratic market swings. There were relatively few days when the Columbus market was 35 to 40 cents under Cincinnati. On the other hand there were relatively few days when Columbus was 5, 10 or 15 cents or more above Cincinnati.

Cleveland showed a much different pattern. This market had about the same number of days when the Cleveland market was either the same as Cincinnati, or 5, 10 or 15 cents over the Cincinnati market. About 58 percent of the days fell in these four price groups. There also were wide swings from this central grouping of market days. There was no pronounced peak as was shown with the Columbus market. There were a few days when the Cleveland market was as much as 40 cents over Cincinnati and about the same number of days when Cleveland was 40 cents under Cincinnati.

These two curves are for the 200 to 220 pound weight group which is the weight that Ohio farmers market most of their hogs in normal situations. These frequency curves point out that different factors have influenced these three Ohio markets in various ways. Cleveland hog prices seem to be more independent and fluctuate differently from Cincinnati and Columbus.

CONCLUSIONS

Hog prices received by farmers in Ohio since 1920 have not held their advantage if 1947 is excluded over other Corn Belt States to the west, namely: Indiana, Illinois, Iowa, and Nebraska. The states adjacent to Ohio—Pennsylvania, Michigan, and Kentucky— have experienced the same trend. During the past 25 years, shifts and changes have been taking place in the livestock and meat industry that have been influencing this trend. One of these has been the shift in the slaughtering industry to the western and northwestern parts of the Corn Belt. During the year 1921, slaughterers located in the states of Minnesota, Iowa, Nebraska, North Dakota, and South Dakota, slaughtered 18 percent of the cattle, 12.6 percent of the calves, 21.5 percent of the hogs, and 16.6 percent of the sheep and lambs killed under Federal Inspection, but for the period 1946 these same slaughterers had increased their kill to 23.2 percent cattle, 19.6 percent calves, 34.9 percent hogs, and 26.3 percent sheep and lambs. Turning to the states of Ohio, Indiana, Illinois, Michigan, and Wisconsin, their kill under Federal Inspection for the same period was 34.4 percent cattle, 35.7 percent calves, 36.5 percent hogs, 31.8 percent sheep and lambs, but for the recent period

it was only 21.8 percent cattle, 29.1 percent calves, 28.2 percent hogs, and 15.5 percent sheep and lambs.

The packing industry has shifted nearer to the supply of livestock, and this has brought a relatively better hog market to the Western Corn Belt as compared to the Eastern Corn Belt. Figure 2 shows this trend for the past 25 years.

Has this trend been stabilized is the question that should concern all those interested in the hog price problem in the Eastern Corn Belt. At present it is too early for one to say. We now are just going through the price gyrations resulting from the influence of World War II. It will probably take to 1953 to 1955 before one will be reasonably sure that stability has been reached. In the meantime, other upsetting influences may enter.

The relationship existing between freight rates for meat from the Western Corn Belt to the Pacific Coast as well as to the Eastern Corn Belt, and to the heavy consuming centers along the Atlantic Coast compared to the rates for the Eastern Corn Belt to the Atlantic Coast are fundamental to this problem, but it was not within the scope of this study to analyze the part freight rates have influenced hog prices.

Ohio marketed more hogs in 1939 than were butchered by Ohio slaughterers, although Ohio had in 1939 more slaughterers¹ than any other state. This situation undoubtedly is true today. On the other hand, Ohio consumes about the same amount of pork as is produced by Ohio farmers. This would seem to indicate a favorable location for meat slaughterers within Ohio. The price farmers receive for hogs between different areas has narrowed so that there are not the same differences that existed in the early or middle twenties. This is especially noticeable for northwestern, northern, and southwestern Ohio. The hog prices at the farm for the state narrowed greatly during the war. This largely was due to the price ceilings and not to any fundamental marketing changes.

When the price for hogs at markets within Ohio is analyzed by grades the period is not of sufficient length to bring out long time trends. The data were collected back to 1937. In analyzing Figure 2, it may be noted that most of the trend changes had taken place by 1937. If a similar study as this should be made for the period ending 1957, some significant changes may appear.

Certain seasonal aspects of hog prices are noted for the Ohio markets for the different weight grades 180 to 200, 200 to 220, and 220

¹ Mimeograph Bulletin 194, October 1946, Ohio Agricultural Experiment Station and Ohio State University.

to 240. This analysis brings out the point that either the marketing system is weak at some markets, or the packers temporarily enjoy undue competitive advantages, or the farmers in certain areas produce seasonally less desirable hogs than other areas. From the meager information available for analysis, it was not possible to answer some of these questions, but probably all three of the above factors were involved.

Some markets have their strong and weak days and farmers get the notion that some days are better than others. For the period of this study there was little to choose on the average between the days of the week. The differences were so small when averaged over the period that they were negligible. This, of course, does not mean that farmers can not gain by selling on a certain day in preference to another. If one is able to judge or guess the ups and downs as shown in Figure 8, he will gain or lose depending on his ability to hit the desirable market, but over a period of months or years, the market on one day of the week is about as good as any other day. The important point to watch, namely, is whether the market trend is up, steady, or down when one is ready to sell his hogs.

Some markets for the same grade of hogs move closely with other markets. That is, if a certain grade changes 25 cents at one market, the same grade at another market on the same day will go up 15, 20, 25, or 30 cents; will remain the same, or decline in the same manner. On the other hand, some markets do not show this same close movement or correlation. This is shown in the statistical analysis. Columbus moves similarly with Cincinnati whereas Cleveland does not show that same close movement. This does not mean that a market will long stay out of line, but it does bring out the independence of action. It may take two or more days before the normal differential is established.

This study has brought out some of the differences and characteristics of hog prices within markets, between markets, and their relationship for a period of time. It is important to note from time to time the changes in trend. The years 1947 and 1948 have shown that Columbus and Dayton markets were not as good as in previous years, while other markets held their relative position. Marketing agencies and farmers must be alert to keep their respective marketing systems functioning at their best. Only in this way can the competitive system be made to function at its best.

APPENDIX A

Daily Price Changes for 200-220 Pound Good to Choice Hogs

The years 1941, 1948, and 1949 were used because they were just before the war and just after price controls were removed. Some of the analyses were for the year 1941 and some for 1948-49.

In the previous sections we have been analyzing and discussing the price differentials between markets and within markets. In this section, we will be concerned with the price changes from day to day in the amount the market price increases or decreases from the previous day as shown in Table 14. Some days, of course, the market does not change. An illustration may help. If the price at one market was \$10.00 for a given grade and on the next day was \$10.40, the market increased 40 cents. In 1941 at Cincinnati there were three such times when that happened, but at Columbus, Cleveland, and Indianapolis there were just two times for each market.

Of course, some days the price did not change from the previous market day. Tables 14 and 15 show that 34 percent of the market days

TABLE 14.—Daily Price Changes from the Previous Market Day for 200-220 lb. Hogs at Various Markets for the Year 1941.

When the Price per cwt.	Cincinnati		Columbus		Cleveland		Indianapolis	
	No. of Days	Pct. of Total	No. of Days	Pct. of Total	No. of Days	Pct. of Total	No. of Days	Pct. of Total
Increased 40c	3	1	2	1	2	1	2	1
Increased 35c	3	1	3	1	3	1	5	2
Increased 30c	2	1	3	1	2	1	2	1
Increased 25c	8	3	9	4	13	5	11	5
Increased 20c	20	8	13	6	7	3	16	6
Increased 15c	26	10	27	12	27	11	23	9
Increased 10c	34	14	33	14	27	11	35	14
Increased 5c	21	8	23	10	9	4	18	7
Remained Same	48	19	46	20	85	34	43	18
Decreased 5c	9	5	10	4	6	2	12	5
Decreased 10c	26	10	18	8	34	14	23	9
Decreased 15c	17	7	17	7	17	7	18	7
Decreased 20c	8	3	11	5	3	1	14	6
Decreased 25c	11	4	14	6	8	3	15	6
Decreased 30c	7	3	3	1	1	0	6	2
Decreased 35c	5	2	1	0	2	1	2	1
Decreased 40c	2	1	1	0	3	1	2	1
Total	250	100 %	234	100 %	249	100 %	247	100 %

in 1941 and 26 percent in 1948 analyzed at Cleveland fell in this group and 18 percent in 1941 and 11 percent in 1948 at Indianapolis. The price changes were much greater for the years 1948 and 1949 as compared to 1941. This is largely due to the fact that prices were approximately three times higher in 1948 and 1949. Price rises and falls of 25 cents and 50 cents were the most common change in 1948 and 1949,

except for Indianapolis, but price changes of 10 cents and 15 cents were the most common in 1941. However, other changes occurred varying from 5 cents to 40 cents in 1941 and from 5 cents to over \$2.00 in 1948 and 1949. In analyzing these tables one can easily see that hog prices fluctuate in anything but a regular pattern. Thus, all the changes for the four markets given in Tables 14 and 15 were so grouped for the year into a frequency distribution.

These price changes from day to day were then correlated mathematically, one market with another such as Columbus with Cincinnati. Thus, if the Columbus market rose 15 cents from the previous day and the Cincinnati market rose 15 cents at the same time, that would be perfect correlation, or 1.0 (one). Likewise, if the market at Columbus dropped 15 cents from the previous day and the Cincinnati market dropped 15 cents also, that would be perfect correlation. On the other hand, if the Columbus market rose 10 cents and the Cincinnati market remained the same, that would be something less than perfect correlation.

Table 16 indicates that both high and low correlation are present. It is interesting to note the low correlation of .47 existing between Cincinnati and Cleveland. A high correlation of .90 exists between Cincinnati and Columbus.

These results indicate that daily price changes in the Columbus market tend to closely follow the price changes at Cincinnati, while the changes at Cleveland tend to vary considerably from those at Cincinnati.

Table 16 also shows the lines of regression for the Columbus and Cleveland markets as correlated with Cincinnati. These equations indicate the slope of the line and the rate of slope.

For example, the first regression equation listed in Table 16, Cincinnati with Columbus, is $-.1360 + .9457552 X$. Multiplying .9457552 by +.40 (the highest mid-value), and adding $-.1360$ gives 37 cents. This is the positive upper end of the line of regression, and the corresponding lower negative and would be figured in the same manner.

The regression line in Figures 10 and 11 shows that when the price at Cincinnati increased 40 cents, the price at Columbus increased only 37 cents, while at Cleveland it increased 22 cents. When the price at Cincinnati decreased 35 cents, the price at Columbus decreased only 33 cents, and when the Cincinnati price decreased 40 cents, the Cleveland price declined only 21 cents.

TABLE 15.—Daily Price Changes from the Previous Market Day for 200-220 Pound Hogs at Various Markets for the Years 1948 and 1949.

When the Price Per Cwt.	Cincinnati				Columbus				Cleveland				Indianapolis			
	1948		1949		1948		1949		1948		1949		1948		1949	
	No of Days	Pct of Total	No of Days	Pct. of Total	No of Days	Pct. of Total	No of Days	Pct of Total	No of Days	Pct of Total	No of Days	Pct of Total	No of Days	Pct of Total	No of Days	Pct of Total
Increased \$2.01-\$2.50	—	—	1	0.6	—	—	—	—	—	—	—	—	—	—	—	—
Increased \$1.51-\$2.00	1	0.4	—	—	1	0.5	—	—	—	—	—	—	1	0.4	—	—
Increased \$1.01-\$1.50	3	1.2	1	0.6	—	—	1	0.4	4	1.9	2	0.8	6	2.4	3	1.2
Increased .76-\$1.00	5	2.0	2	1.1	10	4.5	4	1.8	7	3.3	4	1.6	9	3.6	10	4.1
Increased .51-.75	16	6.4	12	6.9	6	2.7	8	3.5	7	3.3	8	3.3	23	9.1	12	4.9
Increased .50	24	9.6	11	6.3	21	9.4	11	4.8	28	13.4	9	3.7	15	6.0	12	4.9
Increased .45	2	0.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Increased .40	4	1.6	8	4.6	5	2.3	4	1.8	5	2.4	7	2.9	7	2.8	5	2.1
Increased .35	3	1.2	6	3.4	10	4.5	8	3.5	1	0.5	5	2.1	9	3.6	5	2.1
Increased .30	—	—	—	—	—	—	—	—	—	—	—	—	1	0.4	—	—
Increased .25	37	14.7	21	12.0	30	13.5	26	11.4	20	9.5	42	17.3	13	5.2	30	12.3
Increased .20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Increased .15	6	2.4	8	4.6	8	3.6	9	3.9	2	1.0	2	0.8	14	5.6	6	2.5
Increased .10	7	2.8	13	7.4	2	0.9	5	2.2	3	1.4	7	2.9	8	3.2	13	5.3
Increased .05	1	0.4	1	0.6	—	—	—	—	—	—	—	—	—	—	—	—
Remained Same	47	18.7	19	10.8	36	16.2	63	27.5	54	25.8	67	27.6	27	10.7	40	16.4
Decreased .05	—	—	2	1.1	—	—	—	—	—	—	—	—	—	—	—	—
Decreased .10	4	1.6	7	4.0	8	3.6	6	2.6	8	3.8	5	2.1	12	4.8	15	6.1
Decreased .15	5	2.0	7	4.0	8	3.6	8	3.5	2	1.0	7	2.9	11	4.4	14	5.7
Decreased .20	—	—	1	0.6	—	—	—	—	—	—	1	0.4	2	0.8	—	—
Decreased .25	27	10.7	13	7.4	25	11.3	34	14.8	24	11.5	39	16.0	13	5.2	24	9.8
Decreased .30	—	—	—	—	—	—	—	—	—	—	1	0.4	1	0.4	—	—
Decreased .35	2	0.8	5	2.9	5	2.3	5	2.2	2	1.0	3	1.2	8	3.2	5	2.1
Decreased .40	—	—	6	3.4	4	1.8	8	3.5	5	2.4	1	0.4	9	3.6	3	1.2
Decreased .45	—	—	1	0.6	—	—	—	—	—	—	—	—	—	—	—	—
Decreased .50	28	11.1	13	7.4	17	7.6	16	7.0	20	9.6	16	6.6	30	11.9	17	7.0
Decreased .51-.75	14	5.6	10	5.7	17	7.6	9	3.9	13	6.2	9	3.7	19	7.5	21	8.6
Decreased .76-\$1.00	8	3.2	6	3.4	6	2.7	2	0.9	2	1.0	5	2.1	7	2.8	5	2.1
Decreased \$1.01-\$1.50	5	2.0	1	0.6	3	1.4	1	0.4	1	0.5	2	0.8	3	1.2	3	1.2
Decreased \$1.51-\$2.00	1	0.4	—	—	—	—	1	0.4	1	0.5	1	0.4	—	—	1	0.4
Decreased \$2.01-\$2.50	1	0.4	—	—	—	—	—	—	—	—	—	—	2	0.8	—	—
Decreased \$2.51-\$3.00	—	—	—	—	—	—	—	—	—	—	—	—	1	0.4	—	—
Total	251	100.0	175	100.0	222	100.0	229	100.0	209	100.0	243	100.0	251	100.0	244	100.0

TABLE 16.—The Coefficient of Correlation, Line of Regression, and the Standard Error of Estimate of Daily Changes in 200-220 lb. Hog Prices Between Various Markets 1941.

Market Correlated	Number of Days Correlated	Coefficient of Correlation	Line of Regression Equation	Standard error of Estimate
Cincinnati with Columbus	233	.9005	$.4525 + .54561066$	$\pm .0300232$ cents
Cincinnati with Cleveland	246	.479	$-.1360 + .945752$	$\pm .0278305$ cents

Figure 10 shows the differences in the actual slope of the two regression lines, and that a true proportion does not exist. If a true proportion existed, when the Cincinnati price increased 50 cents, the price

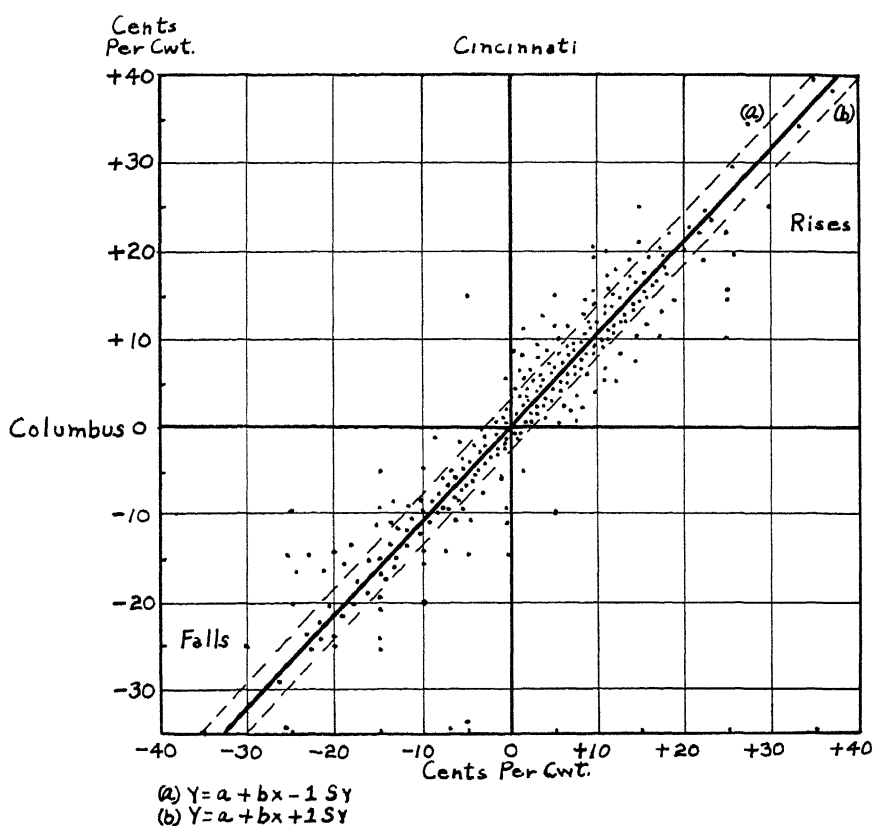


Figure 10.—Daily Price Changes Between Cincinnati (Vertical Axis) and Columbus (Horizontal Axis) for 200-220 Pound Good to Choice Hogs for the Year 1941 (Each dot represents the price for 1 market day).

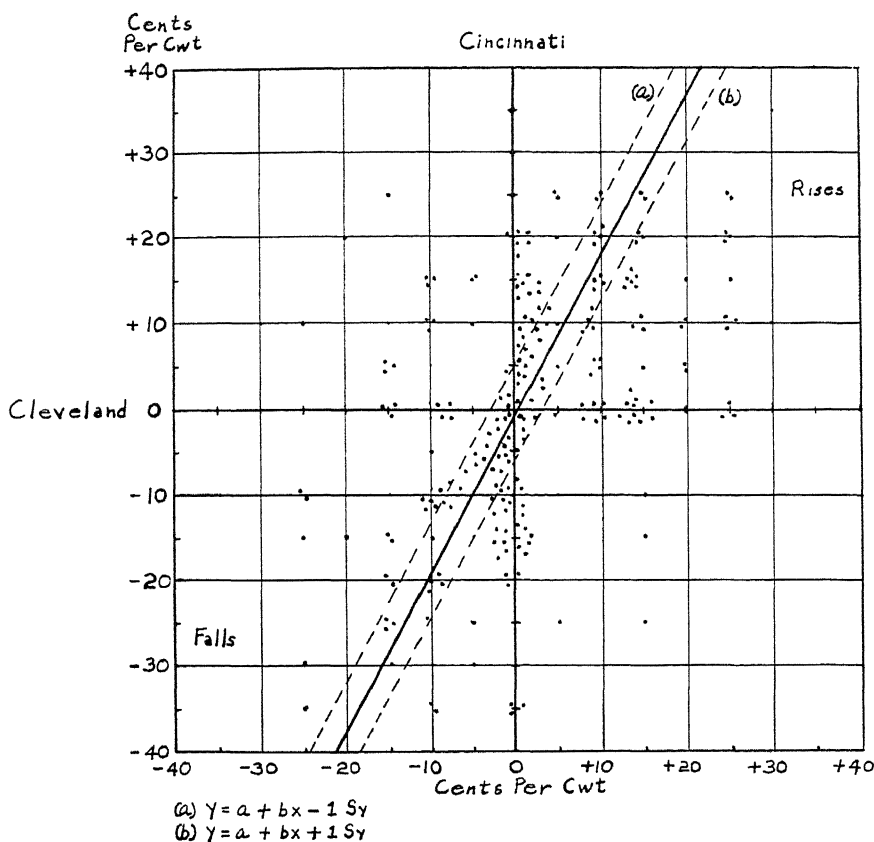


Figure 11.—Daily Price Changes Between Cincinnati (Vertical Axis) and Cleveland (Horizontal Axis) for 200-220 Popnd Good to Choice Hogs for the Year 1941 (Each dot represents the price for 1 market day).

at Columbus would have increased 50 cents. The price changes at Columbus tend to more nearly follow the changes at Cincinnati than do those at Cleveland.

Table 16 and Figure 10 also show the standard error of estimate. If lines are fitted \pm (plus or minus) one standard error from the trend line, it would include about two-thirds of the cases.

For example, with Table 16, with Cincinnati and Columbus, two lines can be constructed by adding and subtracting .0300232 to and from .4242 enabling completion of the equation $Y = a + bx \pm \text{one sy}$. These dotted lines, as shown in Figure 10, will fall above and below the trend line, and should include two-thirds of the total cases.

Figures 10 and 11 show also the relationship between the price changes for Cincinnati with Columbus and Cleveland by means of a scatter diagram. Each dot represents an actual price change. Estimates of price changes can be made for any desired price within the limits of the observations shown on the chart. It is interesting to note the concentration of the cases along the trend line when Cincinnati is correlated with Columbus. There is a lack of concentration away from the trend line when Cincinnati is correlated with Cleveland, and this further justifies the low correlation figure of .48. This also supports the fact that the price changes at Cleveland do not tend to follow closely the price changes at Cincinnati.

Correlation of Daily Hog Prices

The relationship between the daily hog prices shows a much different pattern than do the daily price changes. Table 17 gives the correlation of daily hog prices for 200-220 pound hogs between various markets for the year 1941, and from November 1, 1946 to December 31, 1947.

Starting with the daily prices at Columbus on January 1, 1941, of \$7.35, January 2 of \$7.45, \$7.50, \$7.60, and \$7.60, etc., and at Indianapolis on January 1 of \$7.40, \$7.50, \$7.65, and \$7.65, etc., these prices were correlated from the ungrouped data correlation formula. This analysis does not show how much or in what direction these market prices move in respect to each other, but they are important in that they do indicate that there is a related price movement present, and that some markets tend to be closer in price relationship than others.

An illustration will help explain this table. The correlation figure for Columbus and Indianapolis in 1941 is .998; and for the periods November 1, 1946 to December 31, 1947 it ranged from .926 to .988. This indicates that there is a related price movement present, and that the relationship is very close between these two markets. Now looking at Cleveland and Cincinnati for the same periods, the correlation in 1941 is .995, and from November 1, 1946 to November 1, 1947, it ranged from .827 to .955. This also indicates that there is a related price movement present, but the price relationship is not as close as was Columbus and Indianapolis.

It is interesting to note the lower correlation existing in most of the markets from May 1, 1947 to June 30, 1947. This may be due to many factors, such as seasonal characteristics, weather conditions, accidental, and other marketing factors. These factors tend to be smoothed out when the correlation is figured on a yearly basis as shown in 1941, when the range was only from .995 to .998.

TABLE 17.—The Correlation of Hog Prices for 200-220 lb. Hogs at Various Markets for the Year 1941, and from Nov. 1, 1946 to Dec. 31, 1947.

Market	Nov. 1, 1946 to Feb. 28, 1947	March 1, 1947 to April 30, 1947	May 1, 1947 to June 30, 1947	July 1, 1947 to Aug. 31, 1947	Sept. 1, 1947 to Oct. 31, 1947	Nov. 1, 1947 to Dec. 31, 1947	1941
Columbus - Cincinnati	.9559	.9880	.9262	.9317	.9723	.9871	.9987
Columbus - Chicago	.9543	.9858	.9012	.9302	.9922	.9695	—
Columbus - Indianapolis	.9504	.9849	.9498	.9714	.9566	.9896	.9965
Cleveland - Indianapolis	.9717	.9259	.8441	.9439	.9430	.9396	.9955
Cleveland - Columbus	.9590	.9411	.8563	.9684	.9475	.9559	.9962
Cleveland - Chicago	.9311	.9025	.9188	.9526	.9544	.9779	—
Cincinnati - Indianapolis	.9899	.9506	.9616	.9462	.9891	.9916	.9970
Cincinnati - Chicago	.9820	.9882	.8817	.9450	.9764	.9924	—
Cincinnati - Cleveland	.9262	.9354	.8274	.9403	.9553	.9525	.9956

It is of interest also to note the higher correlation resulting from using the daily hog prices than from using the daily price changes as previously shown. This is due, in part, to the method of computation and the fact that there is considerable difference in figuring correlation on the actual daily price of \$10.00, \$10.25, etc., and figuring it on the daily price change of 10, 15, or 25 cents, or whatever the daily price changes may be.

The correlation analysis points out that some markets closely follow other markets from day to day. On the other hand, some markets fluctuate independently. However, all markets have to keep in line and cannot get too high or too low when compared to certain nearby markets. They do maintain within limits the established differentials. If a market gets too high, supplies will be shifted to it and demand likewise may be shifted away. However, these factors do not always necessarily start working within one day, but will within a few days.

TABLE 18.—The Correlation of Hog Prices for 200-220 lb. Hogs at Various Markets for the Year 1941, and 1947, 1948 by Selected Periods.

Market	1941	Nov. 1946 to Feb. 1947	Jan.- Feb.	Mar.-Apr.		May-June		July-Aug.		Sept.-Oct.		Nov.-Dec.	
			1948	1947	1948	1947	1948	1947	1948	1947	1948	1947	1948
Columbus - Cincinnati	.9987	.9559	.9677	.9880	.9732	.9262	.9139	.9317	.8000	.9723	.9810	.9871	.8794
Columbus - Chicago	—	.9543	.9365	.9858	.9372	.9012	.9420	.9302	.6875	.9922	.9872	.9695	.8746
Columbus - Indianapolis	.9965	.9504	.9952	.9849	.9303	.9498	.9956	.9714	.8228	.9566	.9855	.9896	.8985
Cleveland - Indianapolis	.9955	.9717	.9956	.9259	.9289	.8441	.9813	.9439	.7333	.9430	.9682	.9396	.9079
Cleveland - Columbus	.9962	.9590	.9811	.9411	.9548	.8563	.9873	.9684	.6604	.9475	.9945	.9559	.8759
Cleveland - Chicago	—	.9311	.9765	.9025	.9097	.9188	.9361	.9526	.7267	.9544	.8596	.9779	.9262
Cincinnati - Indianapolis	.9970	.9899	.9530	.9056	.9642	.9616	.9023	.9462	.8735	.9891	.9861	.9916	.9367
Cincinnati - Chicago	—	.9820	.9874	.9882	.9560	.8817	.9867	.9450	.6844	.9764	.9854	.9924	.9135
Cincinnati - Cleveland	.9956	.9262	.9799	.9354	.9416	.8274	.9049	.9403	.7632	.9553	.9709	.9525	.8991